



Fracture Mechanics Simulation

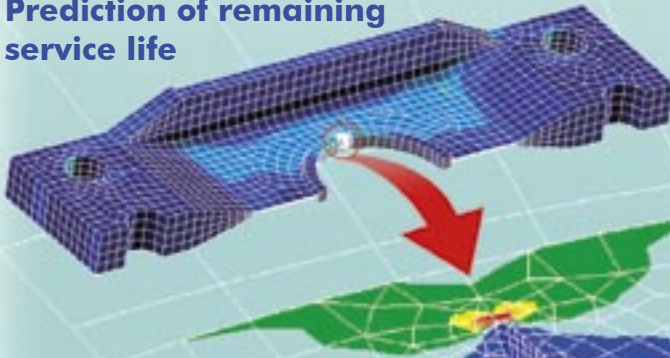
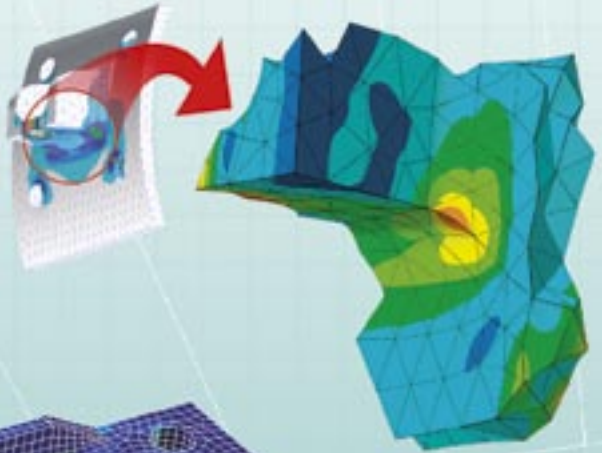
Benefits and Applications

**Fast accurate prediction
of 2D and 3D fracture
mechanics solutions**

**Prediction of crack
growth behaviour**

**Simulation of failure
modes and
effectiveness of design
changes**

**Prediction of remaining
service life**



**integrity.beasy.com - the home
of fracture and failure modelling**

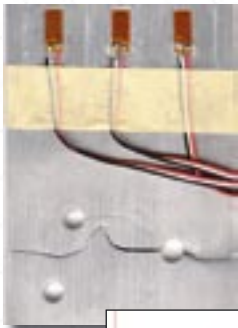
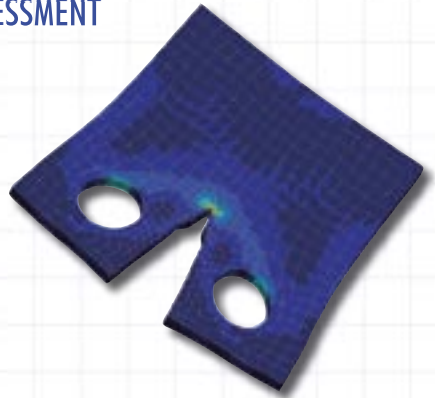
Fracture Mechanics Simulation

Benefits and Applications

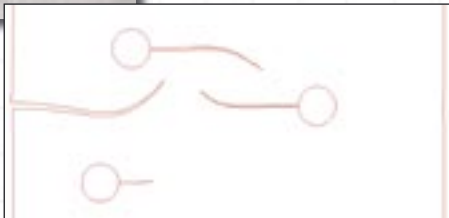
DISCOVER HOW SIMULATION CAN IMPROVE YOUR DAMAGE TOLERANCE AND INTEGRITY ASSESSMENT

Engineers are frequently required to assess structures for damage tolerance and integrity. Computer simulation can provide

- Data on how a crack will behave
- Crack growth rate
- The crack path
- Data to confirm mode of failure
- Data on critical crack size and residual strength.



Experimental test



Beasy prediction

THE NEED TO ANALYSE STRUCTURAL DAMAGE

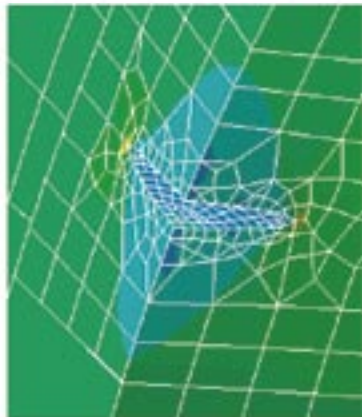
Material properties of structural components often degrade over time as a result of cyclic loading, fluctuations in temperature, or corrosive environments. This degradation of material integrity may manifest itself as discrete flaws in the structure or through localized loss in the section thickness of a critical support

member. Once structural damage has been discovered it is important to be able to accurately evaluate its impact on the continued safe performance of the structural components. Because structural damage is often related to fatigue, which can result in the initiation and growth of cracks, it is critical for

engineers to evaluate the impact of fatigue loading on structural performance.

BEASY is an internationally recognized leader in engineering computation and simulation for structural integrity, damage tolerance, mechanical analysis, and corrosion control and would welcome the opportunity to work with you to meet your fracture mechanics modelling needs.

HOW WE CAN HELP WITH YOUR FRACTURE ANALYSIS NEEDS



used with load spectrum data to perform either single or complex multi-axial load case analyses.

DETERMINING CRACK GROWTH PATH

Mixed mode crack growth can be simulated to accurately predict crack growth paths. This is accomplished using an incremental procedure to extend the crack front. The actual crack shape and path is determined using the minimum

strain energy density criterion and a fatigue crack growth law (i.e. Paris, NASGRO). These crack growth criterion are based upon fracture mechanics criteria and require KI, KII, and KIII as input parameters.

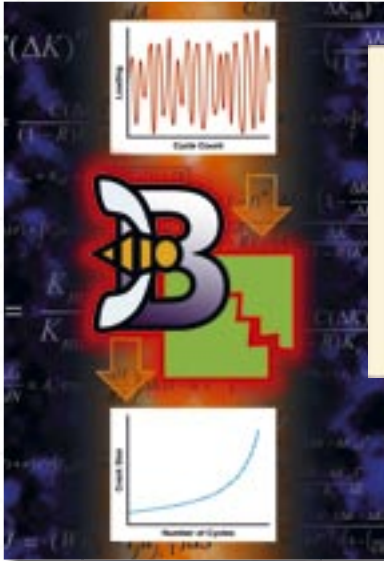
Because we are able to predict, not only the Mode I crack behavior, but also the Mode II and Mode III crack behavior we are not restricted to assuming the crack grows in a planar fashion.

BEASY engineers can quantify the fracture mechanics behavior for the "real part" without any simplifying assumptions. There are no restrictions on component geometry, loading, or crack shape. We can help determine Critical Crack Sizes so that you can improve the timing and quality of your inspection and maintenance programs. Using BEASY's novel crack growth technology our staff can define the most likely crack growth path and help your NDT technicians search for flaws in structural components.

We can also estimate remaining service life for components with existing flaws. Our fracture analysis software is tightly integrated with fatigue crack growth material property databases and can be

WHAT INFORMATION DO WE NEED TO CREATE A MODEL?

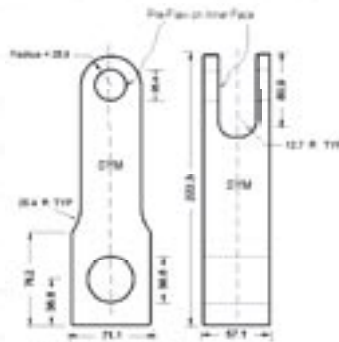
Although a new model can be created from the geometry using modern CAD and modelling software the most convenient solution is to use existing FEM or BEM models which may have been developed to predict the deformation and stresses in the structure or component. Using the BEASY software it is possible to 'zoom in' to where the crack is located and automatically create a model suitable for predicting the crack behaviour.



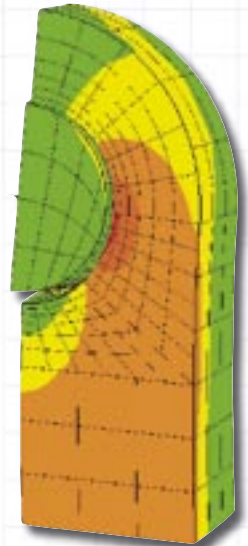
BEASY CRACK WIZARD

A key part of our technology is the Crack Wizard which simplifies and automates the process of performing crack simulations. This enable what would be normally complex processes to be reduced to just a few man hours.

BEASY has developed the software tools necessary to perform coupled contact and crack growth analyses. Our Engineers are able to assess the impact of load redistribution near the crack as contacting components deform. A recent attachment lug analysis highlights the importance of considering the impact of the pin-lug contact forces when computing stress intensity factors for cracks located near the hole bore. With this analysis capability we can also examine the impact of pin clearance fits on crack growth behavior.



Coupled Fracture and Contact Analysis



WHAT DO I DO NEXT?

If you would like to discuss your requirements or obtain further information on BEASY's Engineering Services, contact us:

E-mail: sales@beasy.com

Tel: +44 2380 293223

Tel: +1 978 667 5841



BEASY

Ashurst Lodge, Ashurst,
Southampton, SO40 7AA, UK

Tel: 44 (0) 238 029 3223

Fax: 44 (0) 238 029 2853

Email: sales@beasy.com

On the Internet: www.beasy.com

BEASY

25 Bridge Street, Billerica,
MA 01821, USA

Tel: 978 667 5841

Fax: 978 667 7582

Email: sales@beasy.com

On the Internet: www.beasy.com